IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:
Richard MONTGOMERY, et al.

Serial No.:	10/822,054	Group Art Unit:	2835
Filed:	April 8, 2004	Examiner:	B. Chervinsky
FOR:	COLD PLATE		

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant submits this appeal brief, thus perfecting the notice of appeal filed on February 27, 2006. A petition for a one month extension of time is attached hereto.

The required headings and subject matter follow.

(i) ***Real party in interest.***

This case is assigned of record to Intel Corporation, who is the real party in interest.

(ii) ***Related appeals and interferences.***

There are no known related appeals and / or interferences.

(iii) ***Status of claims.***

Claims 1-20 are pending in the application. Claims 1-20 stand rejected. The rejections of claims 1-20 are being appealed.

(iv) ***Status of amendments.***

No amendments to the claims have been filed after the final rejection. The attached Claims appendix reflects the current status of the claims.

(v) ***Summary of claimed subject matter.***

With respect to independent claims 1, 7, and 13 some embodiments of the invention involve an apparatus (e.g. a cold plate 20, see Figs. 2-7 and related description on page 5, paragraph 0021) including an enclosure (e.g. base member 30 and lid member 40) having a fluid inlet (e.g. inlet 22) and a fluid outlet (e.g. outlet 24) in fluid communication with the fluid inlet (e.g. see Figs. 2-7 and related description on page 6, paragraph 0022), and a channel structure (e.g. see walls 32) inside the enclosure between the inlet and the outlet defining a plurality of radial flow paths (e.g. see Figs. 2-7 and related description at page 6 paragraph 0023), wherein an impingement point (e.g. see impingement point P on Fig. 4) for cooling fluid in the enclosure is located at a position corresponding to an expected relatively hotter spot of a heat source (e.g. see page 6, paragraph 0023). With respect to claim 13, a system may further include an electronic component with the cold plate thermally coupled to the electronic component (e.g. see page 6, paragraph 0024).

(vi) ***Grounds of rejection to be reviewed on appeal.***

I. Claims 1-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,796,370 (Doll) in view of U.S. Patent No. 5,412,536 (Anderson).

(vii) ***Argument.***

I. The rejection of claims 1-20 under 35 U.S.C. § 103(a) as being unpatentable over Doll in view of Anderson is in error and should be reversed.

Claims 1-3, 7-9, 13-15, and 19-20

With respect to claims 1, 7, and 13, the Examiner admits that Doll fails to teach or suggest the recited features relating to an impingement point for cooling fluid in the enclosure is located at a position corresponding to an expected relatively hotter spot of a heat source, and relies on Anderson to provide this missing teaching. In particular, the final office action relies on the following clear factual error. The office action states: "Anderson discloses liquid cooling arrangement having liquid coolant impinged on the hottest spot (col. 6, lines 16-19)." See final office action, page 3, lines 11-12. The cited portion is reproduced below and does not describe what the office action asserts.

> "... For example, the present invention may also be used to cool high local heat flux regions requiring an inert coolant such as mirrors used in high power laser applications."

As is apparent from the foregoing, the Examiner has misconstrued the teachings of Anderson. The cited portion deals only with the general concept of liquid cooling for applications other than electronics and does not teach or suggest locating an impingement point for cooling fluid in an enclosure at a position corresponding to an expected relatively hotter spot of a heat source. The cited portion suggests only that the entire mirror is a 'high local heat flux region' and does not describe directing the impingement point to any relatively hotter spot of the mirror. In fact, Anderson fails to even mention hot spots.

It is important that the Board parse the above teaching from Anderson correctly, without using the benefit of hindsight. Anderson describes "high local heat flux regions" and then employs the connecting phrase "such as" and then identifies an example of "high local

heat flux regions" as being "mirrors". Accordingly, the entire mirror corresponds to the high local heat flux region.

It is also noteworthy that Anderson precedes this example with the phrase "the present invention may also be used" (emphasis added). It is clear that Anderson is not introducing some new teaching, but merely expanding the more comprehensive prior teachings of the reference to another example application. Applicants submit that the more comprehensive teaching of Anderson may be summarized as: Anderson's invention may be used to cool high local heat flux regions requiring an inert coolant such as chip devices used in computer systems.

In fact, Anderson explicitly states that an "object of the invention is increased circuit reliability obtained by operating a high heat flux chip device at a temperature lower than a non-two-phase process would allow." Emphasis added, see col. 2, lines 29-32. It is clear that Anderson considers the entire chip device to be the high flux region to require cooling, and not any relatively hotter spot as wrongly asserted by the Examiner. Likewise, in the portion relied upon by the Examiner, absent the hindsight benefit provided by the present application, one of ordinary skill in the art would understand Anderson to teach only that the entire mirror corresponds to the high local heat flux region.

In reading the references on the claim, the Examiner relies on the electronic component 17 in Doll or the mirror in Anderson to read on the recited heat source in claims 1 and 7 and the recited electronic component in claim 13. However, for the reasons given above, the Examiner has failed to correctly identify any teaching in either reference which reads on 'an expected relatively hotter spot of a heat source', as recited in claims 1 and 7, or 'a relatively hotter spot of the electrical component', as recited in claim 13. Anderson describes only that the entire mirror may be a high local heat flux region and does not teach or suggest anything whatsoever in connection with a relatively hotter spot of the mirror.

Because Doll and Anderson, individually and in combination, fail to teach or suggest an impingement point for cooling fluid in the enclosure is located at a position corresponding

to an expected relatively hotter spot of a heat source, or a relatively hotter spot of an electronic component, the office action fails to establish even a prima facie case of obviousness for claims 1, 7, and 13 and the rejection should be reversed.

The dependent claims 2-6, 8-12, and 14-20 depend either directly or indirectly from claims 1, 7, and 13, respectively, and are likewise patentable. Dependent claims 2-3, 8-9, 14-15, and 19-20 are not argued separately. Dependent claims 4-6, 10-12, and 16-18 are separately patentable for the reasons set forth below.

Claims 4, 10, and 16

With respect to claims 4, 10, and 16, each of these claims recite that the impingement point is offset from a central region of the fins. The final office action completely fails to address the recitations of these claims. This is clear factual and legal error. The office action fails to establish even a prima facie case of obviousness. Accordingly, the rejection of claims 4, 10, and 16 should be reversed.

The office action explicitly acknowledges the recitations of claims 3, 9, and 15, on page 3, lines 5-6 of the final office action ('an impingement point 65 ... which is centrally located'). However, the word 'offset' cannot be found in anywhere in the office action. The Examiner is clearly aware of this claim recitation because the Examiner explicitly admits that Doll fails to teach "having the impingent point offset from the center" in the first office action mailed June 8, 2005 (see page 3, last two lines). Applicants are perplexed and extremely prejudiced by the time wasted in requiring an appeal to address this clear error.

In any event, both Doll and Anderson fail to teach or suggest the recited offset impingement point. Accordingly, claims 4, 10, and 16 are separately patentable over Doll in view of Anderson and the rejection should be reversed.

Claims 5, 11, and 17

With respect to claims 5, 11, and 17, the final office action asserts that Doll discloses that the channel walls provide a high fluid channel aspect ratio since they form narrow fluid channels. The Examiner commits clear factual error by misconstruing the teachings of the Doll reference. As can be seen in many of the figures (e.g. see Figs. 3, 5, and 9), the bottom fin plate 22 with the radial fins 52 and 54 is very low profile, with relatively short fins. Although no dimensions are provided, it is clear from Figs. 8-9 that the aspect ratio is around 1:1 and certainly no more than 2:1. One of ordinary skill in the art would not consider that the channel walls disclosed in Doll provide a high fluid channel aspect ratio.

Because both Doll and Anderson fail to teach or suggest the recited high fluid channel aspect ratio, claims 5, 11, and 17 are separately patentable over Doll in view of Anderson and the rejection should be reversed.

Claims 6, 12, and 18

With respect to claims 6, 12, and 18, the final office action asserts that Doll discloses that the fluid inlet 48 and the fluid outlet 50 are co-located since they are located in the same plane. Again, the Examiner commits either clear factual error, by misconstruing the teaching of the Doll reference, or clear legal error, by misconstruing the claim language. As would be clear to one of ordinary skill in the art from the claim language itself or with reference to the specification (e.g. see paragraph [0036]), as used in claims 6, 12, and 18, co-located means in the same position or located very near to each other on the enclosure. In Doll, the fluid inlet 48 is located on the opposite side of the cold plate from the fluid outlet 50. Oppositely located inlets and outlets are as far as possible away from any reasonable reading of the term co-located. However broadly the Examiner would like to read the term 'co-located', it is unreasonably broad to read the term on oppositely located inlets and outlets. Quite simply, one of ordinary skill in the art would not consider that the inlet 48 is co-located with the outlet 50.

Because both Doll and Anderson fail to teach or suggest the recited co-located fluid inlet and fluid outlet, claims 6, 12, and 18 are separately patentable over Doll in view of Anderson and the rejection should be reversed.

CONCLUSION

In view of the foregoing, favorable reconsideration and reversal of the rejections is respectfully requested. Early notification of the same is earnestly solicited. If there are any questions regarding the present application, the Examiner and / or the Board is invited to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,

May 30, 2006
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(viii) ***Claims appendix.***

1. An apparatus, comprising:

an enclosure having a fluid inlet and a fluid outlet in fluid communication with the fluid inlet; and

a channel structure inside the enclosure between the inlet and the outlet defining a plurality of radial flow paths,

wherein an impingement point for cooling fluid in the enclosure is located at a position corresponding to an expected relatively hotter spot of a heat source.

2. The apparatus of claim 1, wherein the enclosure comprises a lid member and a base member, and wherein the channel structure comprises:

a plurality of cooling fins disposed between the lid member and the base member, the fins defining a set of channel walls which form radial flow paths from an impingement point radially outward to a perimeter of the enclosure.

3. The apparatus of claim 2, wherein the impingement point is centrally located with respect to the fins.

4. The apparatus of claim 2, wherein the impingement point is offset from a central region of the fins.

5. The apparatus of claim 2, wherein the channel walls provides a high fluid channel aspect ratio.

6. The apparatus of claim 1, wherein the fluid inlet and the fluid outlet are co-located on the enclosure.

7. A method, comprising:

providing an enclosure having a fluid inlet and a fluid outlet in fluid communication with the fluid inlet;

forming a channel structure inside the enclosure between the inlet and the outlet defining a plurality of radial flow paths; and

locating an impingement point for cooling fluid in the enclosure at a position corresponding to an expected relatively hotter spot of a heat source.

8. The method of claim 7, wherein forming the channel structure comprises:

disposing a plurality of cooling fins disposed between a lid member and a base member, the fins defining a set of channel walls which form radial flow paths from an impingement point radially outward to a perimeter of the enclosure.

9. The method of claim 8, further comprising:

locating the impingement point centrally with respect to the fins.

10. The method of claim 8, further comprising:

offsetting the impingement point from a central region of the fins.

11. The method of claim 8, wherein the channel walls provides a high fluid channel aspect ratio.

12. The method of claim 7, further comprising:

co-locating the fluid inlet and the fluid outlet on the enclosure.

13. A system, comprising:

an electronic component; and

a cold plate thermally coupled to the electronic component, the cold plate comprising:

an enclosure having a fluid inlet and a fluid outlet in fluid communication with the fluid inlet; and

a channel structure inside the enclosure between the inlet and the outlet defining a plurality of radial flow paths,

wherein an impingement point for cooling fluid in the enclosure is located at a position corresponding to a relatively hotter spot of the electrical component.

14. The system of claim 13, wherein the enclosure comprises a lid member and a base member, and wherein the channel structure comprises:

a plurality of cooling fins disposed between the lid member and the base member, the fins defining a set of channel walls which form radial flow paths from an impingement point radially outward to a perimeter of the enclosure.

15. The system of claim 14, wherein the impingement point is centrally located with respect to the fins.

16. The system of claim 14, wherein the impingement point is offset from a central region of the fins.

17. The system of claim 14, wherein the channel walls provides a high fluid channel aspect ratio.

18. The system of claim 13, wherein the fluid inlet and the fluid outlet are co-located on the enclosure.

19. The system of claim 13, further comprising:

a heat dissipation device coupled to the cold plate by a loop of tubing;

cooling fluid disposed in the tubing; and

a pump adapted to circulate the cooling fluid.

20. The system of claim 19, further comprising:

a fan adapted to provide cooling air to at least one of the heat dissipation device and the cold plate.

(ix) ***Evidence appendix.***

None.

(x) ***Related proceedings appendix.***

None.